

prising means for causing the receiver tuning to be swept across a defined range, and means for detecting signals carried by received signalling signals and characteristic of the transmitting station.

- 5 2. A receiver according to claim 1, in which the received signals are applied to a threshold device, and the tuning is successively swept across the range, the threshold being successively reduced on each sweep until a desired station is detected.
- 10 3. A receiver according to claim 1 or 2, including means for storing the frequencies at which the received signalling signals are detected.
 4. A broadcast television or radio receiver, including a store for storing desired programme
 - 15 information, means for providing an audible or visual indication of the commencement of an impending programme held in the store, and, in the absence of a manually-initiated confirmation signal, causing the programme to be recorded.
 - 20 5. A broadcast television or radio receiver provided with a light pen and associated circuitry by means of which information can be entered into the receiver.
 6. A receiver according to claim 5, in which the
 - 25 receiver includes a store, and the information from the light pen is entered into the store.
 7. A receiver according to claim 6, in which the receiver includes means for detecting signalling signals received on a broadcast transmission, and
 - 30 for comparing the received signalling signals with stored signals.
 8. A receiver according to claims 6 or 7, including means for providing an audible or visual indication of the commencement of an impending programme,
 - 35 and, in the absence of a manually-initiated confirmation signal, causing the programme to be recorded.
 9. A receiver according to claim 6, 7 or 8, in which the information includes programme duration information.
 - 40 10. A receiver according to any of claims 5 to 9, in which the information includes station identification information.
 11. A receiver according to claim 10, in which the receiver includes a frequency directory correlating
 - 45 the station information with corresponding channel or frequency information.
 12. A receiver according to claim 11, in which the receiver includes means for sequentially tuning the receiver to successive ones of the station frequencies, and means for detecting the frequency at which
 - 50 the strongest signal is detected.
 13. A receiver according to claim 11 or 12, in which the receiver includes means for detecting signalling signals received on a broadcast transmission, and for entering channel or frequency information into the directory in response thereto.
 - 55 14. A receiver according to any of claims 5 to 13, including means for causing the receiver tuning to be swept across a defined range, and means for
 - 60 detecting signals carried by received signalling signals and characteristic of the transmitting station.
 15. A broadcast receiver substantially as herein described with reference to the drawings.

Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd.,
Berwick-upon-Tweed, 1980.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY,
from which copies may be obtained.

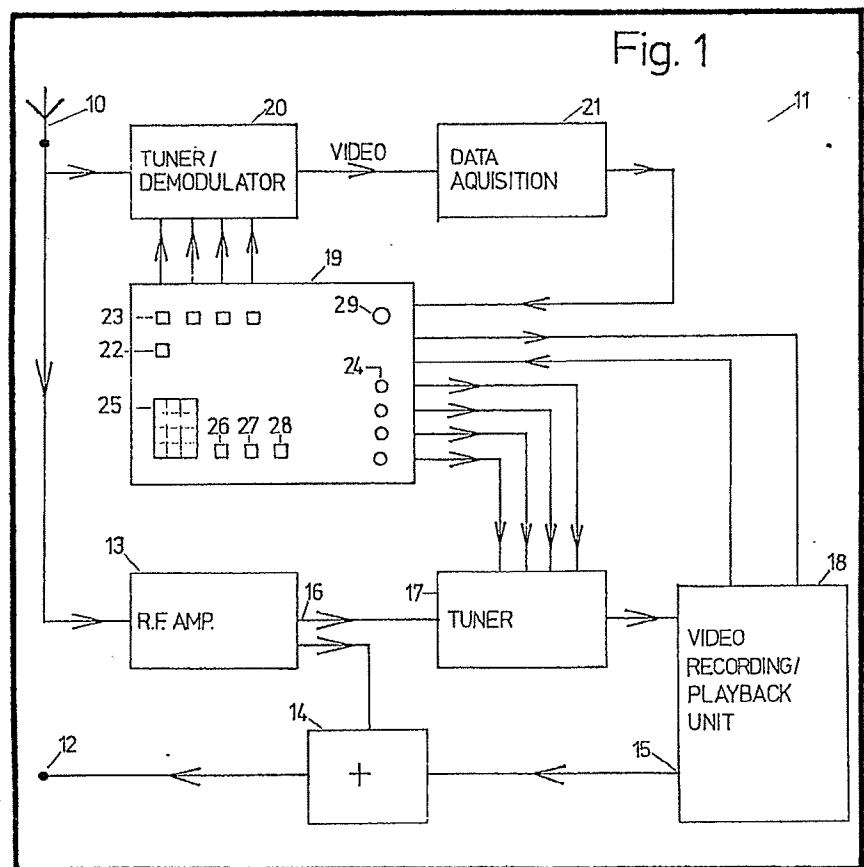
(12) UK Patent Application (19) GB (11) 2 126 002 A

(21) Application No **8224447**
 (22) Date of filing **25 Aug 1982**
 (43) Application published
14 Mar 1984
 (51) **INT CL³**
G11B 15/02 H04N 7/00
 (52) Domestic classification
G5R B264 B311 B373
B37Y B421 B449 B601
B60X B721 B784 B788
B789 QA
 (56) Documents cited
GB 1506945
GB 1265541
WO 8100945
 (58) Field of search
G5R
H4F
 (71) Applicant
Simon William Breese,
31 Sandilands Road,
Fulham,
London,
SW6 2BD
 (72) Inventor
Simon William Breese
 (74) Agent and/or address for
 service
Reddie & Grose,
16 Theobalds Road,
London,
WC1X 8PL

(54) Automatic control for recording apparatus

(57) Teletext data is transmitted containing, in each page on each channel, a current programme code indicating the television programme currently being transmitted in the same channel. A video cassette recorder 11 has a switchable monitoring tuner/demodulator 20 which switches cyclicly through the transmission channels and supplies sufficient demodulated video to a teletext data acquisition unit 21 to allow the program codes of each channel to be supplied as parallel data

to a selector and control unit 19. The transmission signals are coupled from the aerial 10 through an amplifier 13 to a switchable tuner 17 which is controlled by the unit 19. The output of the tuner 17 feeds a video recording/playback unit 18 which can be switched on to record by the unit 19. Selected programme codes are entered into a RAM in the unit 19 by use of channel selector switches 23 and programme code keys 25. When the unit 19 detects that a current programme code is the same as a preselected programme code, it switches the tuner 17 to the relevant channel and switches on the unit 18 in its recording mode.



GB 2 126 002 A

Fig. 1

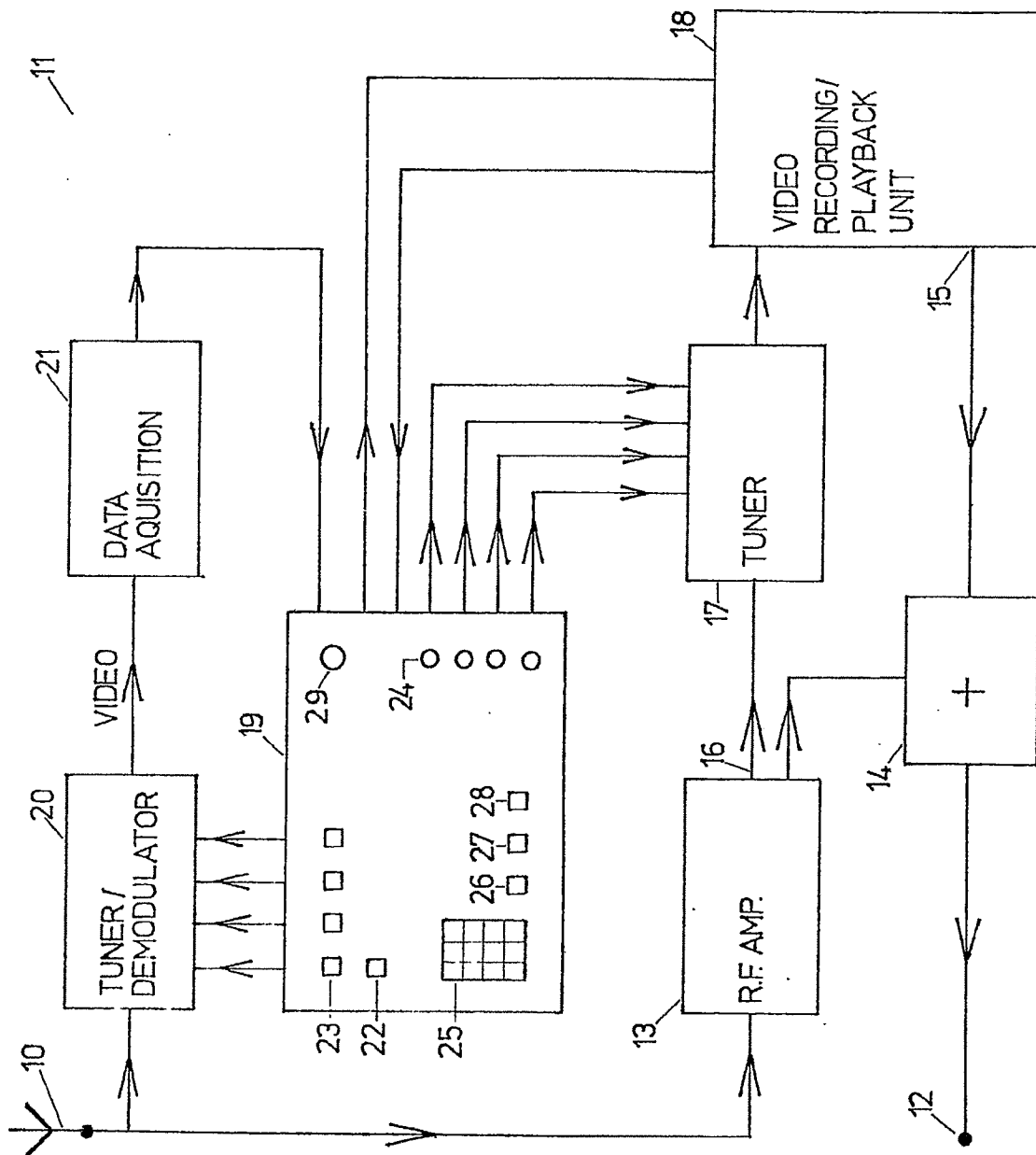
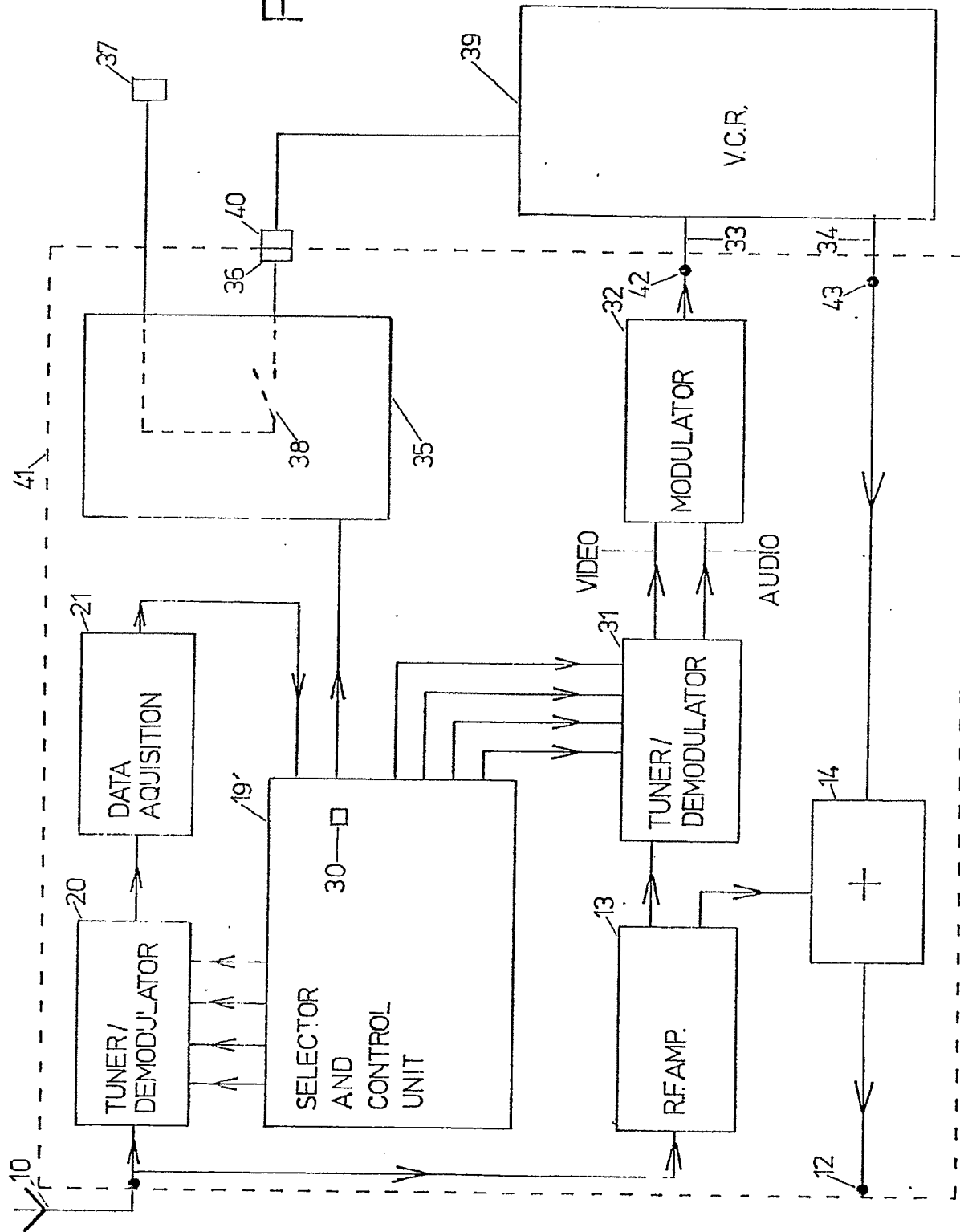


Fig. 2



SPECIFICATION

Automatic control for recording apparatus

This invention relates to automatic control for recording apparatus, and especially, but not
 5 exclusively, to automatic video recording apparatus.

Hitherto, domestic video cassette recorders have usually been equipped with a time switch which enables the user to select a television
 10 channel to be recorded from, and to preset the times at which the recorder is to switch on to record from the chosen channel and to switch off. Some such recorders, e.g. the JVC HR7700EK, allow a plurality of preselected recordings of
 15 different channels to be preset to take place within a period of days. However, the use of a time switch inherently makes it impossible to ensure that the desired recording is obtained, since television programmes may run late or be
 20 rescheduled. One object of the present invention is to provide a system whereby a selected programme can be recorded regardless of alterations in its time of transmission.

The teletext system of transmission enables
 25 textual matter to be transmitted to suitable television receivers. At present, teletext data signals are transmitted in lines 17 and 18 in even television fields and in lines 330 and 331 in odd television fields, although such data can be
 30 transmitted in any of lines 7 to 22 and 320 to 335. In each line, 52 microseconds are available for teletext data, and 45 data bytes are transmitted in each line. On a teletext screen display, there are 24 rows of 40 characters each. The 40
 35 characters of any particular row are transmitted during a single field line available for teletext data. Rows making up a page, i.e. a teletext screen display, are transmitted consecutively and thus
 40 12 fields are required to transmit one teletext page. A teletext receiver is equipped with a page store into which the data of a selected page is written at the slow rate at which the data is
 45 received. However, the data is read out at a higher rate to provide a steady, flickerless image on the display screen of the receiver. In addition to each page of data including a page code to allow its
 50 selection by the user of a receiver, each row of each page has a row code to allow the page store to be addressed with the data in the necessary manner. Thus, it is possible to identify any row in a page of teletext data. Alternatively, the bytes or bits of a page of teletext data can be uniquely
 55 identified by the order of their occurrence in the page. In one embodiment of the present invention, data included at a fixed position in every page of data transmitted can be acquired and compared with a preset piece of data and, if the comparison shows the received and preset data to be the same, a control signal is produced
 60 which establishes a recording process.

In accordance with a preferred embodiment of the present invention, the BBC and ITV teletext transmissions would include, in each page transmitted, a code indicative of the television

65 programme being transmitted on the received channel at the same time. The codes for programmes would be published with other programme details, and would also be given on
 70 teletext pages listing television programmes and transmission times, etc. A separate teletext page may also be transmitted to publicise and explain classifying codes applied to programmes and usable to identify the category into which any particular programme falls.

75 To avoid continual presentation of the current programme code in the teletext receiver displays, the number of rows in each page can be increased to 25, the 25th row can give the current
 80 programme code and will be suppressed in teletext receivers by not being stored in the page store. A long running series of programmes, a group of related programmes and programmes always devoted to a particular category of subject matter, such as news or weather forecasts, can be
 85 given, respectively, a common programme classifying code so that automatic recording apparatus embodying the present invention can be set, in a single operation, to record all programmes having a chosen common code.
 90 Programme codes can include an indication of whether or not the transmission is a repeat, so that the automatic recording apparatus can ignore repeats if necessary.

If it is considered that the current programme
 95 code should not be transmitted in every teletext page, the current programme code can have added to it a coded indication of whether the programme is starting or ending, and be transmitted in a few pages at the beginning of the
 100 programme and a few pages at the end of the programme. Automatic recording apparatus embodying the present invention will, in such circumstances, decode the indication of starting or ending and accordingly start or stop the
 105 recording of the programme transmitted. However, if a technical fault interrupts the transmission of a programme, it will then be necessary to transmit the programme stop at the beginning of the fault and the programme start at
 110 the end of the fault if recording of the interruption is to be avoided, whereas in the system in which the current programme code is transmitted in every page while the programme is running, the recording can stop automatically at
 115 the beginning of a transmission fault and begin again automatically at the end of the fault.

Alternatively, automatic recording apparatus embodying the invention may be arranged to start
 120 recording on first receiving a preselected programme code and to count up to a predetermined maximum number of receptions of the code before ceasing to record after receiving say the tenth transmission of the programme code, which would be arranged to occur in the
 125 last field transmitted in the programme being recorded. No indication of whether a programme is starting or ending need then be transmitted.

To enable the user to choose to record programmes from more than one channel,

automatic recording apparatus embodying the invention may have a sufficient number of tuners to monitor all television transmission channels simultaneously, each tuner feeding its own data acquisition unit which in turn supplies demodulated teletext data to a common selector and control unit in which each stream of teletext data is monitored for the occurrence of any preselected programme code, and control signals are generated on the occurrence of such a code to set another tuner to the appropriate channel and switch on demodulating and recording circuitry and equipment to record the video and audio content of the transmission received through this other tuner. Alternatively, there may be a switchable tuner feeding a single data acquisition unit, and the selector and control unit be such as to supply to the switchable tuner control signals which set the tuner to each channel to be monitored in a predetermined cyclic order. Thus the television transmission channels can be monitored in a multiplexing mode, each channel being sampled for sufficient time, such as half a second, to ensure that a complete page of teletext data is acquired in each sampling, the selector and control unit being such as to store the current programme code for each sampled page of each channel and to carry out comparison processes on the stored data. The selector and control unit for both of these two embodiments has, in addition to means for entering and storing chosen programme codes, means for entering and storing priority status signals assigned to channels and/or programmes, so that if programmes chosen for recording are on different channels and either start simultaneously overlap, the selector and control device can be set to establish recording of the whole of one of these contemporaneous programmes. Also, preferably, the selector and control unit is arranged to receive a signal indicative of the mode of operation of record/playback circuitry and equipment so that if the apparatus is in the playback mode when a programme to be recorded is sensed an audible and/or visible alarm can be activated to inform the user. This facility can be extended to include such warning activity if the apparatus is adapted to be used with a video camera, so that such a warning can be given if, during recording from the video camera, a programme to be recorded begins.

In another system embodying the present invention, recording of a chosen programme is made partly dependant on time, in so far as programme codes are limited to distinguishing between programmes occurring on the same day, and automatic recording apparatus embodying the invention is arranged to sense the date included in the header row of each page and to combine this with the current programme code included elsewhere in the page to obtain a unique combination by which the required programme can be identified. Such a system can accommodate the late running of a programme, but not re-scheduling to another day.

The invention can of course be used where

teletext and normal television programmes are transmitted by cable. Also, where other videotex systems are used but can contain current data on broadcast transmissions of television and/or radio, automatic recording apparatus embodying the invention can be provided with means for obtaining the videotex data, e.g. through a modem or other suitable coupling device. For example, Antiope videotex data can be received from a telephone system modem and the Antiope transmissions adapted to convey programme codes associated with channel codes so that automatic recording apparatus embodying the invention can control a switchable tuner in accordance with preselected combinations of programme code and channel code.

A preferred embodiment of the automatic recording apparatus according to the invention has a selector and control unit which includes a microprocessor coupled to a read only memory containing a program by which the microprocessor is adapted to store data in assigned regions of a random access memory and to manipulate such data so as to produce control signals for setting a switchable tuner to receive transmissions on respective chosen channels when predetermined television programme codes are received as input data by the selector and control unit. The unit also has a keyboard to enable a user to enter television programme codes, priority selections, and possibly repeat inhibitors into assigned regions of the random access memory.

Where such an embodiment of the invention is intended to operate in response to channel-specifying programme codes transmitted in the teletext data part of a single television channel, but referring to a plurality of contemporaneously transmitted programmes on separate channels, so that each page of the teletext data which includes the channel-specifying programme codes contains or may contain, depending on whether such codes are transmitted in every page or only in a group of pages at the beginning and end of each programme, any number of such codes from one to the full number of channels, the program which is held in the read only memory includes instructions for a process whereby the channel-specifying programme codes are sorted according to the respective channels to which they refer. Thus the channel-specifying programme codes may be combination of a programme code and a channel code, as in the case of an embodiment for the Antiope system.

To reduce the time required to acquire the programme codes of any channel where a plurality of television channels transmit teletext data in which only the programme codes for the current programmes on that channel are included, automatic recording apparatus embodying the present invention in the preferred form incorporating a microprocessor-based selector and control unit can be provided with a processing program which causes the selector and control unit to detect the row containing the

programme code in each complete first page received in each channel and thereafter to sample the teletext data in each channel only at the times, relative to the detected programme code row, at which television programme codes will occur. The processing program can include steps whereby if no television programme code is detected at the expected time, a complete page in that channel is detected again to re-establish a reference time from which the sampling for programme codes can begin again.

The invention will now be described in more detail, solely by way of example, with reference to the accompanying drawings in which:—

Fig. 1 is a block diagram of automatic recording apparatus embodying the invention, and

Fig. 2 is a block diagram of automatic tuner apparatus embodying the invention and connected to control a conventional video cassette recorder.

Fig. 1 illustrates a video tape recorder 11 connected to an aerial 10 to record pre-selected television programmes from a plurality, in this case four, of television channels, television programme codes being included as part of the data forming each page of data transmitted as teletext data in the four channels. It is assumed that each channel transmits teletext data in lines 17 and 18 and 330 and 331 of alternate fields, each field being formed by $312\frac{1}{2}$ lines, and there being 50 fields per second. It is also assumed that the teletext format is either the present day standard of 24 lines of 40 characters each, or 25 lines of 40 characters each with the 25th line containing the current programme code and not being displayed on teletext receivers.

The video cassette recorder 11 has an output socket 12 to be connected to a television receiver (not shown) by a coaxial cable (not shown). The aerial 10 is coupled to the socket 12 through a radio frequency amplifier 13 and a summing junction 14 whose other input is the playback output 15 of the recorder 11, such an arrangement being conventional to allow use of the television receiver while the recorder 11 is recording the same or another programme. The amplifier 13 is automatically switched off when the recorder 11 is in its playback mode.

The amplifier 13 has a second output 16 which feeds a switchable tuner 17 the output of which feeds the video recording and playback unit 18 of the recorder 11 in its recording mode.

The channel to which the tuner 17 is switched is controlled by a selector and control unit 19 which is a microprocessor-based unit. The unit 19 also controls a monitoring switchable tuner/demodulator 20 which receives input directly from the aerial 10 and feeds demodulated video to a teletext data acquisition unit 21 which has a data slicer, a teletext data gate and input shift register, a framing code detector, a data clock generator, serial to parallel conversion circuitry and error detection circuitry (not shown) and may be substantially as described at pages

23 to 39 of Teletext and Viewdata by Steve A. Money, ISBN 0-408-00579-1, published in 1979 by Butterworth & Co. (Publishers) Ltd of London. The data acquisition unit 21 provides the selector and control unit 19 with teletext data in parallel form.

The selector and control unit 19 has a manual/presetting mode selector switch 22 which, when depressed, enables the unit 19 to be preset to cause the recorder 11 to record selected programmes occurring in the future. Four channel selector switches 23 are provided. If the mode selector switch 22 is not depressed, the channel selector switches 23 can be used to select manually the channel to which the tuner/demodulator 20 is switched. The selector and control unit 19 will then automatically switch the tuner 17 to the same channel. Four channel indicator lights 24 are provided on the unit 19 to indicate to the user which channel the tuner 17 is passing to the recording and playback unit 18.

When the unit 19 is in the presetting mode, the switch 22 being depressed, programme codes must be entered using code keys 25, each key representing, for example, one of the ten digits one to nine and zero and the appropriate channel selector switch 23 being operated before the programme codes for that channel are entered. If it is desired to preset an order of priority for programmes on different channels which may overlap or start at the same time, a channel priority switch 26 is depressed immediately after the mode selector switch 22 and the four channel selector switches 23 operated in sequence in the desired order of priority. The channel priority switch 26 is then released. To override channel priority or simply to preset priority for any particular programmes when channel priority is not preset, a programme priority switch 27 is provided. This switch 27 does not lock and is pushed immediately after the programme code of the programme for which overriding priority is required has been entered. It is arranged that if channel priority has been established, programme priority entries associated with programme codes entered for the channel having first priority are ignored since they are redundant. A correction switch 28 is also provided which is operated to cancel the last instruction or erase the last entry. A warning light 29 is illuminated if a programme for which the recorder 11 is preset to record is sensed and the recorder 11 is occupied in an incompatible mode such as playback.

The construction and operation of the selector and control unit 19 will now be described in more detail but is not illustrated in Fig. 1.

The unit 19 has a microprocessor arranged to operate in accordance with instructions constituting a processing program held in a ROM. There is also a RAM in which regions are assigned to the storing of teletext data from the data acquisition unit 21, control data from the switches 22, 23, and 25 to 28, data temporarily stored during manipulation, and output data to be used to control the tuner 17, the tuner/demodulator 20 and the lamps 24 and 29, and the output and

input data relating to the recording and playback unit 18. The unit 19 controls the energisation of the recording and playback unit 18 for manual and preset recordings, and monitors the mode of operation of the unit 18 for the purpose of controlling the state of the lamp 29. The switches, the tuner 17 and tuner/demodulator 20, the data acquisition unit 21 and the recording and playback unit 18 are connected to respective peripheral interface units, which may in some cases be simple latching arrangements, in the control unit 19. The current condition of each controlled or input device is held in the respective interface unit and is used as input data and/or output control data by the microprocessor. The interfacing of the switchable tuner/demodulator 20 to the unit 19 involves a circulating register which determines which one of the channels is being passed by the tuner/demodulator 20 at any given time, the contents, e.g. three zero states and a single one state, of the circulating register being shifted circularly under the control of the microprocessor using an assigned area of the RAM as a tuner/counter, or as an image of the state of the circulating register.

When the unit 19 is in its presetting mode, separate regions of the RAM are assigned to serve as stores for the programme codes relating to respective channels. If the channel priority switch 26 is used, the order of operation of the channel selector switches 23 in the channel priority setting is stored in the RAM to serve as the order in which the contents of the separate regions of stored programme codes are checked against each received programme code detected in the data received from the data acquisition unit 21. In these storage regions, an additional bit is assigned to each programme code to indicate whether the programme priority switch 27 was operated immediately after the entry of that code. The entire contents of each of the separate regions, except empty portions, are read and compared against each received programme code, and the decision to switch or not to a particular channel is made taking into account both channel priority and, if present, programme priority.

Other embodiments may include means whereby an automatic recording apparatus is adapted to record either normal transmissions or teletext transmissions, and the apparatus can be preset to detect the occurrence of chosen teletext page numbers and to record those pages.

Fig. 2 shows the present invention embodied in an automatic tuner apparatus 41 which is inserted between the aerial 10 and a conventional video cassette recorder 39 which may be equipped with a conventional time switch, the automatic tuner apparatus 41 including some units and elements which are substantially identical to those having the same reference numerals in Fig. 1. The apparatus 41 includes a selector and control unit 19' which is substantially the same as the unit 19 of Fig. 1 but

includes a switch 30 for setting the apparatus 41 in non-recording, monitoring-only mode in which the apparatus 41 monitors teletext transmissions for preselected current programme codes but does not establish recording when any such code is detected but simply indicates the condition by means of the warning light 29 shown in Fig. 1.

Instead of the switchable tuner 17 of Fig. 1, the apparatus of Fig. 2 has a switchable tuner/demodulator 31 which supplies demodulated video and audio to a modulator 32 which produces at an output socket 42 a fixed television carrier frequency modulated with the video and audio signals received from the tuner/demodulator 31. The aerial socket of the video cassette recorder 39 is connected to the socket 42 by a coaxial cable 33, and the playback output socket of the video cassette recorder 39 is connected by a coaxial cable 34 to an input socket 43 of the apparatus 41, this socket 43 being connected as shown to the summing circuit 14, the amplifier 13 being switched off when the apparatus 41 is in the non-recording, monitoring-only mode.

The tuner/demodulator 31 is controlled by the selector and control unit 19' in the same way as the tuner 17 is controlled by the unit 19 of Fig. 1.

The mains supply plug 40 of the video cassette recorder 39 is engaged with a suitable socket 36 in the apparatus 41, and the mains supply plug 37 of the apparatus 41 is coupled to the socket 36 by a controlled power supply unit 35. The power supply unit 35 is controlled by the selector and control unit 19' in the same way as the video recording and playback unit 18 of Fig. 1 is controlled by the corresponding unit 19. The power supply unit 35 is such that, so far as its function of coupling the plug 37 to the socket 36 is concerned, it acts as an on/off switch 38 controlled by the unit 19', the switch 38 being held closed whenever a programme selected to be recorded is being received. The power supply unit also continually supplies power at suitable voltages to the other units of the apparatus 41, but does not switch off these voltages unless a man manually operated, on/off switch (not shown) of the apparatus 41 is opened.

In use, the video cassette recorder 39 is switched on for recording and its tuner set to receive the television frequency generated by the modulator 32. However, the recorder 39 will not record until the selector and control unit 19' closes the switch 38, whereupon power is supplied to the video cassette 39 and the desired programme, now carried on the frequency produced at the socket 42, is recorded by the recorder 39. When the programme ends, the unit 19' opens the switch 38, and the recorder 39 stops recording but is ready to begin recording again as soon as the next programme to be recorded is received by the automatic apparatus 41.

To allow recording of teletext transmissions, the tuner/demodulator 31 of Fig. 2 can be modified to include a teletext decoder unit

to produce teletext display video signals which can be supplied to the modulator 32. The unit 19' is also modified to include means for preselecting pages of teletext in each channel and for developing a picture/teletext control signal which is applied to the modified tuner/demodulator 31 to determine whether the picture video or the teletext display video of the chosen channel is produced and supplied to the modulator 32.

The units 19 and 19' may be equipped with further lamps for indicating the condition of the unit. For example, one lamp may light to indicate that the unit 19 or 19' is in its manual mode, no programmes having been preselected, and another lamp may light to indicate that the unit is in its preset mode, programme codes having been preselected and the tuner/demodulator 20 being cycled through the transmission channels. Such lamps may be controlled by a suitable peripheral interface device which itself is controlled by the microprocessor.

To reduce the dedicated circuitry and avoid the need for special switches such as the switches 2, 23, 25, 26, 27 and 28, the microprocessor and its program may be such that a conventional micro-computer type keypad can be used instead, and the significance of entries made with the keypad be determined by the use of codes signifying to the microprocessor that, for example, the next four digits entered are the transmission channel identities in the order of priority to be observed. Codes can also be used to indicate the selection of one or other of the modes of use, i.e. manual or presetting, of the unit 19 or 19'. Preferably the unit 19 or 19' also includes a display, such as a liquid crystal display, for indicating the most recent entry made by means of the various switches or the keypad of the unit.

The codes transmitted to identify programmes are preferably formed as follows: channel number, programme number, programme category, repeat indicator, and new series indicator. The channel number, programme number and programme category are preferably transmitted as teletext codes for one, four and three decimal digits respectively, and the two indicators as binary digits. A further binary digit, indicating start or end of programme, may also be transmitted. Also, when such codes are entered into a unit such as the unit 19 or 19', or another microprocessor-based selector and control unit having a keypad for entering data instructions, a further binary digit may be entered to indicate whether programme priority is required or not. The repeat indicator bit may be "1" whenever the programme concerned is a repeat of an earlier programme transmitted within the same week or fortnight, for example. As an alternative to using decimal digit teletext codes, octal coding may be used for economy in transmissions and in storage in the selector and control unit.

The significances of the different parts of each code in the preferred example are as follows.

The channel number identifies the channel transmitting the programme.

The programme number is a unique number, for programmes in a given channel, assigned to a particular programme or series of programmes.

The programme category classifies the programme in accordance with a hierarchical system of categories. For example, the first digit classifies the programme as falling within one of, for a decimal system, ten broad categories such as light comedy or current affairs, the second digit defines the classification more narrowly as falling within one of ten sub-divisions of the first category, in the present example. The third digit narrows the definition further. For example, programme categories of 231, 232 and 233 may indicate respectively special current affairs programmes on scientific subjects, on British politics and on European politics, the second digit 3, signifying a special programme as distinct from daily and weekly programmes which would be identified by second digits of 1 and 2 respectively.

The repeat indicator is "0" for a first transmission within a given time interval, and "1" for any subsequent transmission within that time interval, which may be a week or a fortnight, for example. This information can be used in apparatus embodying the invention to reject repeats of programmes selected for recording.

The new series indicator is "1" for a new series and "0" otherwise, and can be used as a means for easily presetting an apparatus embodying the invention to record any new series if it is arranged that by entering as the programme number the four characters "...", all programmes falling within the programme category specified are recorded if the conditions imposed by the repeat indicator and the new series indicator are met. With such an arrangement, all programmes without exception within a specified category can be preselected for recording by entering "." for the repeat indicator and the new series indicator into a suitable selector and control unit.

The new series indicator could also be transmitted to identify single new programmes not forming part of a series and not being a regular feature.

The start/end of programme digit, which is either "1" or "0", e.g. "1" for the beginning of a programme and "0" for the end, can be transmitted where the automatic recording apparatus may require such information to enable it to start and stop recording. Hence a programme code with this digit must be transmitted slightly in advance of the beginning and immediately at the end of the programme to be recorded.

Alternatively, to avoid the need for circuitry capable of distinguishing between complete absence of a programme code and the presence of a programme code having "0" as the start/end digit, a programme digit "1" may be included in a programme code transmitted while the programme is in progress until the programme is about to change, whereupon a programme digit "0" is included in the programme code to indicate that a new programme code is about to be transmitted, and should be monitored for

checking against preselected codes.

- Preferably there is overlap in the transmission of programme codes in a channel, so that where advertisements are transmitted before and after programme material, the advertisements at such positions will be transmitted with two programme codes, that of the programme just finished and that of the programme about to begin. Thus where automatic recording or tuner apparatus embodying the invention is such as to require the transmission of start of programme and end of programme signals, the two programme codes, one incorporating a stop digit and the other a start digit, can be transmitted together during and only during the advertisements occurring between the two programmes. The stop digit can of course be included only at the end of such advertisements, if desired. Where start and stop digits are not needed and the automatic apparatus requires transmission of the programme code throughout a programme to be recorded, two programme codes can be transmitted during the advertisements occurring between the two programmes to ensure that advertisements before and after programmes are recorded.

- Some examples of possible entries for preselecting programmes to be recorded will now be given in which "." is used as the entry for a digit which is to be treated as unspecified, i.e. "." = don't care.

Entry	Instruction
2 1014...1..	Record programme 1014 on channel 2 if a repeat.
3 2078.....	Record programme 2078 on channel 3 even if it is a repeat.
32330..	Record all programmes on channel 3 in category 233 unless a repeat.
....5620..	Record all programmes, regardless of channel, in category 562, unless they are repeats.
1562.1.	Record all new programmes in category 562, even if repeats.
2 1014.....1	Record programme 1014 on channel 2, even if another programme is being recorded (unless the programme currently being recorded is itself a priority programme).
11	Give programmes on channel 1 priority unless a programme with more specific priority has been specified.

- The last example requires the automatic recording apparatus to recognise the entry as a general instruction and may be used where, instead of the complete set of channels being

- given an order of priority as with the switches 23 of the unit 19, it is necessary only to specify one channel as having priority. The penultimate example requires the automatic recording apparatus to operate in accordance with a rule that the first priority programme to start being recorded is recorded for its duration, provided that the first priority programme has been preselected by the use of its programme number. Thus, the more specifically a programme with priority has been defined in the preselection operation, the higher priority it takes for recording. This general rule for priority can be implemented by giving specification of the programme number highest priority, then, in descending order of priority, three digits of category specified, two digits of category specified, one digit of category specified, and finally, channel specified, each such specification being associated with the entry of the priority binary digit "1".

The invention will now be described in general terms in the following claims.

85 Claims

1. A method of controlling automatic recording apparatus, comprising including in videotex transmissions programme codes identifying concurrently transmitted programmes.
2. A method according to claim 1, wherein the videotex transmissions are transmitted in a single channel and the transmitted programmes are transmitted in a plurality of channels.
3. A method according to claim 1, wherein the videotex transmissions are teletext transmissions and are transmitted in a plurality of channels, and the programme codes transmitted in each respective channel identify only the concurrently transmitted programmes transmitted in the same channel.
4. A method according to claim 3, wherein each page of teletext data transmitted includes the current programme code.
5. A method according to claim 3, wherein groups of successive pages of teletext data which include the current programme code are transmitted at the beginning, and the end of the current programme.
6. A method according to claim 4, wherein groups of successive pages of teletext data which include the current programme code are transmitted at the beginning and end of any transmission interruption to the current programme.
7. A method according to claim 5 or 6, wherein coded start and stop instructions are transmitted adjacent the current programme code in dependence upon whether or not the recording should be started or stopped.
8. A method according to any preceding claim, wherein two programme codes are transmitted concurrently with at least part of the transmission of programme bridging material, for example advertising material, the two programme codes being those respectively of the programme

preceding and the programme following the bridging material.

9. Automatic recording apparatus including means for receiving and recording transmitted programmes, means for receiving videotex transmissions and decoding current programme codes, and means for storing selected programme codes and causing the apparatus to record the corresponding programmes at the occurrence of the corresponding current programme codes.

10. Apparatus according to claim 9, wherein the apparatus is a video recording apparatus.

11. Apparatus according to claim 10, wherein the means for receiving videotex transmissions comprises means for receiving and demodulating the teletext transmissions.

12. Apparatus according to claim 11, wherein the means for receiving and demodulating teletext transmissions is adapted to switch cyclically to each of a plurality of channels.

13. Apparatus according to claim 12, wherein the means for storing selected programme codes and causing the apparatus to record the said corresponding programmes includes a micro-processor adapted to store the said selected programme codes in a random access memory.

14. Apparatus according to any one of claims 9 to 13, wherein the means for storing selected programme codes and causing the apparatus to record the said corresponding programmes includes means for assigning priorities to a plurality of programme transmission channels so as to determine which selected programme shall be recorded if there is overlap of two or more selected programmes.

15. Apparatus according to any one of claims 9 to 14, wherein the means for storing selected programme codes and causing the apparatus to record the said corresponding programmes includes means for assigning priority to a chosen selected programme code so as to determine that the chosen selected programme shall be recorded if there is overlap between that programme and any other selected programme.

16. Automatically controlled tuner apparatus

including a tuner, means for receiving videotex transmissions and decoding therefrom codes relating to currently broadcast programmes and means for storing selected ones of such codes and activating the tuner in response to reception of the preselected codes.

17. Apparatus according to claim 16, wherein the means for receiving videotex transmissions comprises means for receiving and demodulating teletext transmissions.

18. Apparatus according to claim 17, wherein the means for receiving and demodulating teletext transmissions is adapted to switch cyclicly to each of a plurality of channels and the said storing and actuating means is such as to switch the said tuner to the channel of a programme for which the said code is preselected.

19. Apparatus according to claim 18, wherein the means for storing selected programme codes and causing the apparatus to record the said corresponding programmes includes a microprocessor adapted to store the said selected programme codes in a random access memory.

20. Apparatus according to claim 18 or 19, wherein the said storing and actuating means includes means for assigning priorities to a plurality of programme transmission channels so as to determine which selected programme shall be tuned to if there is overlap of two or more selected programmes.

21. Apparatus according to claim 18 or 19 or 20, wherein the said storing and actuating means includes means for assigning priority to a chosen selected programme code so as to determine that the chosen selected programme shall be tuned to if there is overlap between the programme and any other selected programme.

22. Apparatus according to claim 16 and substantially as described hereinbefore with reference to Fig. 2 of the accompanying drawings.

23. Apparatus according to claim 9 and substantially as described hereinbefore with reference to Fig. 1 of the accompanying drawings.